# *Federal Aviation Administration*
# *Office of System Capacity*

## *Capacity Initiatives and System Performance Measures*

Recurrent AIP Training - Austin, TX

Donald J. Guffey

May 19, 1998

# *Capacity Initiatives and System Performance Measures*

- Airport Design Team Program
  - Airport Capacity Enhancement Plans
- Simulation Models
  - Benefit Streams
- Capacity Initiatives
  - Procedures and Technology
- System Performance Measures

# *Federal Aviation Administration*
# *Office of System Capacity*

# *Airport Design Team Program and Model Availability Background*

Recurrent AIP Training - Austin, TX

Donald J. Guffey

May 19, 1998

# *Airport Design Team Program*

- Airport Design Team Program
  - Team of Major Airport Users and the Community
  - Recommendations by Consensus and Industry Buy-In Based upon Delay Cost Savings
  - Customized Capacity Solutions
  - Provides Benefit Streams for Cost Benefit Analysis
  - Expert Simulation Service Usually Provided Free of Charge to Airport Sponsor or FAA
  - Recent Studies / Updates

# *Airport Design Team Program*

- Capacity “Options”
  - Technology-Based Capacity
  - Procedural-Based Capacity
  - Runway / Airport Capacity
  - Develop a Set of Alternatives and Improvements
  - Local-Based Experts - Tell Us and We can Model it
  - Got a Better Idea or Alternative - Let’s hear it!

# *Capacity Enhancements*

- Types of Studies
  - En Route and Center Airspace
  - Airport Design Team
  - Tactical
  - Terminal Airspace
  - Regional Design Team

# *Capacity Enhancements*

- Regional Design Team Concept
  - Multiple Runways and Multiple Airports
  - Single Terminal Airspace Environment
  - Measures Impacts of Alternatives on Other Airports and Terminal Airspace
  - You're the Experts - Tell us and We can Model it.
  - Team Effort with Unbiased Results - Not the Airport's nor the Airline's
  - Model Transfer for Further Analysis

# *Airport Design Team Program*

- Design Team Program Benefits
  - Most comprehensive and coordinated planning effort the Agency conducts
  - Provides the Team with detailed information of how, how much and where the delays occur
  - Provides the local decision makers with the benefit streams and the value of each improvement in order to prioritize projects
  - Maximizes technological and procedural capacities
  - Calibrated model transferred for further analysis

# *Capacity Enhancements*

- Major Capacity Enhancements
  - Multiple Parallel Approach Program (MPAP)
  - Flight Management System (FMS) Approaches - FMS SIDs and STARs and MAP
  - Converging Approach Technical Working Group (CASTWG)
  - NASA AATT and TAP
  - Joint Industry Wake Vortex Team
  - Free Flight

# *Simulation and Modeling*

- Simulation Models and System Models
  - Different Models for Different Opportunities
  - Problem Complexity
    - » Scope of Problem - Airspace or Airport
    - » Time Horizon - Project or Answer
    - » Funding Availability
  - Public Domain versus Proprietary Models
  - Clarification of Personal Opinion and Bias
  - Licensing Fees and Costs of Study Disclaimer

# *Simulation and Modeling*

- Public Domain Versus Proprietary Models
  - Model Validation / Standard and Acceptability
    - » Appearance of Bias - Airport's Consultant
    - » Ownership - Proprietary Retain Model and Data
  - Liability - Proprietary Models
    - » Also Applies to Benefit Streams in CBA
  - Model Calibration - Aircraft Sequenced over Fix
    - » Ability to Duplicate Results (Reliability)
  - Cost - Public Domain Cheaper - No License Fee

# *Simulation and Modeling*

- Model Outputs
  - Maximum Throughput Capacity - Large Delays
  - Sustainable Capacity - Acceptable Delay
  - “Burst” Capacity - Short Duration 20-30 Mins Max
  - Surplus Departure Capacity
  - Runway or Airfield Delay - 95% Runway Related
  - Arrival or Departure Delays - Phase of Flight
  - Location of Delays - Runway Crossings, Staging Aprons, Taxiway Bottlenecks or High Speed Exits

# *Simulation and Modeling*

- Simulation Models and System Model
  - Airport, Airfield, Airside and Gates
    - » Airfield Delay Simulation Model - ADSIM
    - » The Airport Machine
  - Airspace and Airfield Models
    - » Airport and Airspace Sim Model - SIMMOD
    - » Total Airport and Airspace Model - TAAM
  - System Models
    - » NASPAC

# *Simulation and Modeling*

- Airfield Delay Simulation Model - ADSIM
  - Airport, Airfield, Airside and Gates
  - PD - Small Fee and Cost of Study $50-250K
  - FAA's Tech Center and a Few Consultants
  - FAA - Over $10M in Data Bases and Data
  - Control of the Model and Code Modifications
  - Short Version RDSIM
    - » Runways Account for 95% of Delays

# *Simulation and Modeling*

- The Airport Machine
  - Airport, Airfield, Airside and Gates
  - Proprietary - Modest Licensing Fee and Cost of Study $50-250K
  - A Number of Consulting Firms - Large and Small
  - FAA - Over $10M in Data Bases and Data
  - No Control of the Model and Code Modifications
    - » Positive - Many “Unadvertised” Feathers and Ease of Modifications

# *Simulation and Modeling*

- SIMMOD
  - Airspace, Airport, Airfield, Airside and Gates
  - PD - Small Fee and Cost of Study $250K - $1M
  - FAA's Tech Center and Many Consultants
  - FAA - Over $25M in Model and $25M in Data Bases and Data
  - Very Slow Formal Code Modifications
  - Often Too Much Model for Airport Concern

# *Simulation and Modeling*

- TAAM
  - Airspace, Airport, Airfield, Airside and Gates
  - Proprietary - $1.3M Licensing Fee and Cost of Study $250-1M
  - FAA's Potomac Project and Few Consultants

# *Simulation and Modeling*

- NASPAC
  - System Model - System Impacts Only
  - PD - Cost of Study $250K - $1M
  - FAA's Tech Center and MITRE

# *Cost Benefit - Benefit Stream Only*

- Initial Screening Device / System Impact
  - LOI Project Selection
  - Look Up Table By Project Type
    - » Example - Independent Runway - System Impact = 85% of Local Delay Cost Savings
    - » Example - Staging Aprons - SI = 45% Local DCS
    - » Example - ARFF Vehicle - SI = 0% Local DCS
  - Multiple LOIs NASPAC Runs for Best Combination of Projects to Maximize System Impact

# *Cost Benefit - Benefit Stream Only*

- Cost Benefit Analysis for AIP / LOI Projects
  - Comments Due to Draft Interim CBA Policy
    - » Allows Use of Proprietary Models - Litigation
  - All of the Major Projects' Benefit Streams at the Top 50 Airports Are Modeled
  - Continued Use of ASC Design Teams Delay Cost Savings Benefit Streams

# *Airport Capacity Enhancement*

- CONCLUSION
  - Regional Expert - Regional Capacity Program Manager - Capacity and “Right” Models
  - Design Teams - Very Valuable & Free of Charge
  - All Major Runways Already Modeled
    - » Why Pay Again, especially if you won’t own it.
  - FREE FLIGHT IS COMING!
  - ARE “YOUR” AIRPORTS READY FOR IT?